AP Calculus AB
Tuesday, April 16, 2013

Present two more problems
Derivatives/Integrals of natural log, e, and inverse trig functions

Go over diagnostic

You are in here for ETEH all week, starting today

① $f(x) = e^{\sin x}$
Find $f'(x)$.

$f'(x) = (\cos x)e^{\sin x}$

② $f(x) = e^{3x}$
find $f'(x)$

$f'(x) = 3e^{3x}$

③ $\frac{1}{3}\int 3e^{3x}dx$

Let $u = 3x$
$du = 3dx$

$\frac{1}{3}\int e^{u}du$

$= \frac{1}{3}e^{u} + C$

$= \frac{1}{3}e^{3x} + C$

④ $\int_1^e \frac{4}{x}dx$

$\int \frac{1}{x}dx = \ln|x| + C$

$= 4\int_1^e \frac{1}{x}dx$

$= 4\ln|x|\Big|_1^e$

$= 4(\ln e - \ln 1)$

$= 4(1-0)$

4

$2^3 = 8$
$\log_2 8 = 3$
Equiv. forms

$\log_e x = \ln x$

$\ln_e 1 = c$
$e^c = 1$
$c = 0$

$\ln_e e = b$
$e^b = e$
$b = 1$

$\log_{10} 10 = 1$

$\log 100 = 2$

$\log 0.1 = -1$

$\log \frac{1}{10}$

$\log 10^{-1}$

$\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x$

5. Which of the following functions increase without bound as x approaches 2 from the right?

I. $f(x) = \frac{1}{x-2}$

II. $f(x) = \frac{x+2}{x^2-4}$

III. $f(x) = \frac{x-2}{x^2-x-2}$

$$\boxed{\frac{1}{x-2}} \rightarrow x=2$$

x	$\frac{1}{x-2}$
2.1	
2.01	
2.001	

$$\frac{\cancel{x+2}}{(x-2)\cancel{(x+2)}} = \frac{1}{x-2} \rightarrow x=2$$

$$= \frac{x-2}{x^2-x-2}$$

$$= \frac{\cancel{x-2}}{\cancel{(x-2)}(x+1)}$$

$$\frac{1}{x+1} \rightarrow x=-1$$

13. Let $f(1) = 3$, $f'(1) = 2$, and $f'(3) = 7$ be given. If $h(x) = f(x^3)$, then $h'(1) =$

$h(x) = f(x^3)$

Need $h'(x)$

Chain Rule

$h'(x) = f'(x^3) \cdot 3x^2$

$h'(1) = f'(1^3) \cdot 3 \cdot 1^2$

$h'(1) = 2 \cdot 3 = 6$

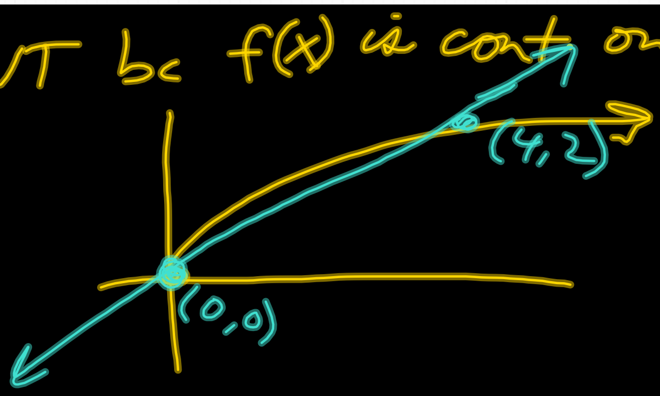
17. If $f(x) = \sqrt{x}$ for all real numbers x, then there exists a number c in the interval $0 < x < 4$ that satisfies the conclusion of the Mean Value Theorem.

Which of the following could be c?

Can use MVT bc f(x) is cont on (0,4).

$$f(x) = x^{1/2}$$

$$m_{sec} = \frac{2-0}{4-0} = \frac{1}{2}$$



$$f'(x) = \frac{1}{2}x^{-1/2}$$

$$f'(c) = \frac{1}{2}$$

$$\frac{1}{2}c^{-1/2} = \frac{1}{2}$$

$$c^{-1/2} = 1$$

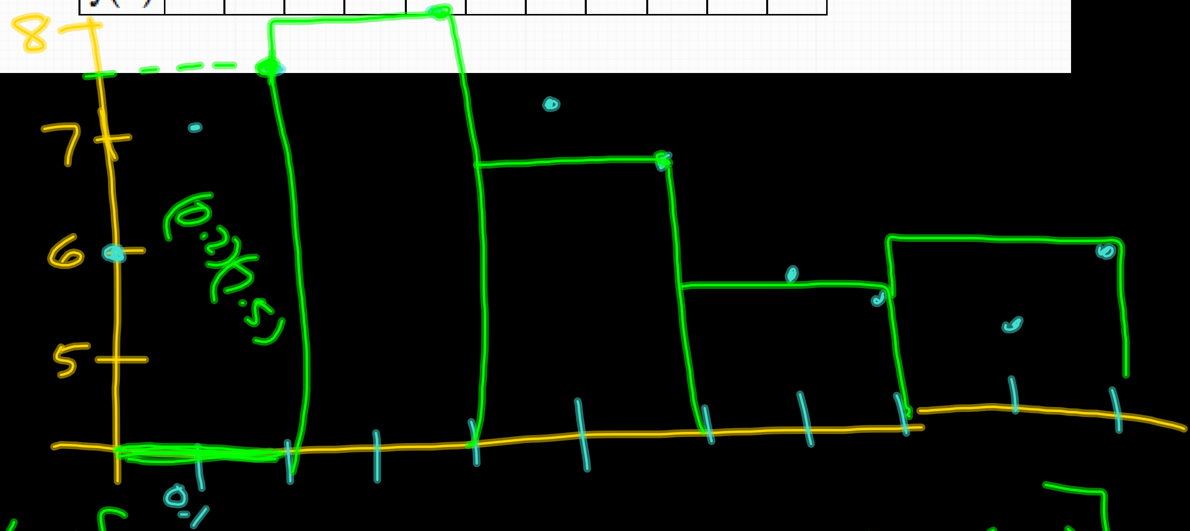
$$\frac{1}{\sqrt{c}} = \frac{1}{1}$$

$$\sqrt{c}^2 = 1^2$$

$$c = 1$$

35. Suppose $f(x)$ is a continuous function. A table of selected values of $f(x)$ is shown below. What is the approximate value of $\int_0^1 f(x)\,dx$ using a right Riemann sum with five subintervals of equal length?

x	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
$f(x)$	6.0	7.1	7.5	8.3	7.9	7.3	6.5	5.7	5.0	4.7	5.5



$(0.2)[f(0.2)+f(0.4)+f(0.6)+f(0.8)+f(1.0)]$

4.

Let $f(x) = \begin{cases} \dfrac{x^2-4}{x-2} & x < 2 \\ \sqrt{x-1} & x \geq 2 \end{cases}$

Which of the following statements must be true about $f(x)$?

I. $\lim\limits_{x \to 2^-} f(x)$ exists

II. $f(2)$ exists

III. $f(x)$ is continuous at $x = 2$

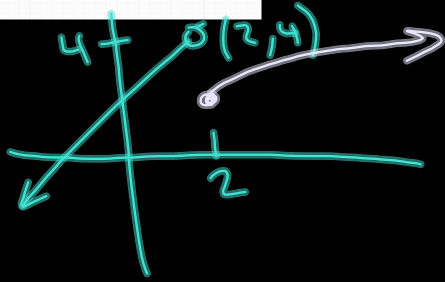
$\sqrt{2-1}$

$\sqrt{1}$

1

$$\frac{\cancel{(x-2)}(x+2)}{\cancel{x-2}}$$

$x+2$ RD @ $x=2$



x^{even}

x^{odd}

$$\lim_{x \to -\infty} \frac{4x^3+1}{x^3-2}$$

num = denom → Ratio of LC's

num > denom → none

num < denom → 0

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7. Let $f(x) = \frac{x-3}{x^2-5x+6}$. Which of the following *must* be true?

I. The line $x = 2$ is a vertical asymptote of $f(x)$.

II. The line $x = 3$ is a vertical asymptote of $f(x)$.

III. The line $y = 0$ is a horizontal asymptote of $f(x)$.

- ~~I only~~
- ~~II only~~
- ~~I and II only~~
- I and III only
- I, II, and III
- I don't know

$$\frac{x-3}{(x-3)\underbrace{(x-2)}}$$

← Previous | Next →

Your progress 10 / 50

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
37	38	39	40	41	42
43	44	45	46	47	48
49	50				

All answers saved ✓

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10. An equation of the line tangent to $y = x^3 - 3x^2 + x - 2$ at its point of inflection is

- $y = -2x - 1$
- $y = -3x + 4$
- $y = -2x - 3$
- $y = 2x - 5$
- $y = 3x - 3$
- I don't know

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$y' = 3x^2 - 6x + 1$

$y'' = 6x - 6$

$y'' = 0$ when $x = 1$

$y(1) = 1 - 3 + 1 - 2$

$y(1) = -3$

POI: $(1, -3)$

$y'(1) = 3 - 6 + 1 = -2$

$y + 3 = -2(x - 1)$

$y + 3 = -2x + 2$

$y = -2x - 1$

Your progress 12 / 50

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
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